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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,128	11/25/2003	Bruce D. Dike	08814-00006	6196
21918	7590	04/28/2006	EXAMINER	
DOWNS RACHLIN MARTIN PLLC 199 MAIN STREET P O BOX 190 BURLINGTON, VT 05402-0190			LAVARIAS, ARNEL C	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 04/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

**Office Action Summary**

Application No.

10/721,128

Applicant(s)

DIKE, BRUCE D.

Examiner

Arnel C. Lavarias

Art Unit

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 and 12-28 is/are pending in the application.
- 4a) Of the above claim(s) 3-5, 10, 16-25, 27 and 28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 2 and 7 is/are allowed.
- 6) ☒ Claim(s) 6, 8, 9, 12-15 and 26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/24/06 has been entered.

### ***Response to Amendment***

2. The amendments to Claim 26 in the submission dated 2/24/06 are acknowledged and accepted. In view of these amendments, the objections to the specification and claims in the Office Action dated 9/1/05 are respectfully withdrawn.

### ***Response to Arguments***

3. The Applicant's arguments filed 2/24/06 have been fully considered but they are not persuasive.
4. The Applicant argues that, with respect to newly amended Claim 26, the combined teachings of either Tanaka et al. and Hoppe, or Tanaka et al., Hoppe and Phillips Electronics fails to teach or reasonably suggest the formation of a real floating image in free space. In particular, the Applicant argues that the combined teachings of the above

references would not form a perceivable and effective floating image that is viewable by an observer. The Examiner respectfully disagrees. It is particularly noted that features upon which applicant relies (i.e., 'perceivable and effective' floating image; an observer; an observer's eyes; a numerical aperture of an imaging cone) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, it appears that Applicant has confused the formation of a real image with how such an image may be viewed by an observer. The recited claims merely claim an apparatus for projecting a real image. How an observer views such an image is dependent on where the observer is located. If the observer is located on the same side of the real image with the projection system, a screen is required to backscatter the real image light to the observer, otherwise the observer will not see the real image. However, if the observer is located on the opposing side of the real image away from the projection system, no screen is required to view the image, since the light forming the real image is sent directly into the observer's eyes. It is noted that the recited claims do not preclude additional elements, such as additional optical elements or a screen, from being present in the claimed invention. Finally, it is noted that Tanaka et al. specifically discloses that the various projector embodiments disclosed produce either a curved or flat (if correcting optics are utilized) image field or image surface in free space (See for example 60 in Figure 8; col. 9, lines 36-63), and that this image field is projected onto a screen (See for example 5 in Figures 8-9).

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5. In addition, the Applicant argues that the term 'real image' inherently includes the concept that the image is capable of being directly visually perceived by a viewer, i.e. an image is something that is visually perceivable. The Examiner respectfully disagrees. Again, features upon which applicant relies (i.e., 'visually perceived' image, a viewer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, Applicant's disclosure only requires that the image be viewable, and not actually be visually perceivable (See for example Applicant's Abstract).
6. Claims 6, 8-9, 12-15, 26 are now rejected as follows.

### ***Drawings***

7. The originally filed drawings were received on 11/25/03. These drawings are acceptable.

### ***Specification***

8. The abstract of the disclosure is objected to because of the following informalities:  
Abstract, line 5- 'features' should read 'feature'  
Abstract, line 6- 'features' should read 'feature'.  
Correction is required. See MPEP § 608.01(b).
9. The disclosure is objected to because of the following informalities:  
Paragraph 0009, line 4- '56' should read '44'

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Paragraph 0011, line 4- delete 'of' after 'systems'

Paragraph 0029, line 5- 'systems.' should read 'systems).'

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 6, 13, 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Ferguson (U.S. Patent No. 5572363).

Ferguson discloses a system (See for example Figures 1, 3) for projecting a real floating image into free space (See for example 34', 11 in Figure 3; col. 7, lines 20-40), comprising at least one image source (See 20 in Figures 1, 3) operatively configured to provide a source image (See 33 in Figure 1; 33' in Figure 3); and an optical system (See for example 30, 32, 71, 31' in Figure 3) located a distance from the at least one image source, the optical system comprising at least one converging element (See for example 30 in Figure 3), and a broadband reflector-polarizer (See 31' in Figure 3; col. 10, line 66- col. 11, line 12; col. 11, lines 41-62); the converging element being operatively configured, and the distance being selected, so that, when the at least one image source provide the source image, the optical system forms a real floating image of the source image in free space. Ferguson further discloses a beamsplitter (See 31' in Figure 3)

located in the optical path between the source and the real image when the system is in use; and the broadband reflector-polarizer comprises a cholesteric liquid crystal structure (See 31' in Figure 3; col. 10, line 66-col. 11, line 12).

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 6, 8-9, 12-15, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (U.S. Patent No. 5853240), of record, in view of Hoppe (U.S. Patent No. 5715023), of record, alone, or at least further in view of Phillips Electronics (EP0606940 A2), of record.

Referring to the discussion of Figures 8-9, Tanaka et al. discloses a system for projecting a real floating image into free space, the system comprising at least one image source (3c) operative configured to provide a source image; and an optical system (40c) located a distance from said at least one image source, the optical system comprising: at least one converging element (41c); and a cholesteric reflector-polarizer (13c); said converging element being operative configured, and the distance being selected so that, when said at least one image source provides said source image, said optical system forms a real floating image of said image source in free space, *such that a projection screen can be located at the location of the floating image to reflect the real image to an*

*observer*. Thus, Tanaka et al. discloses the invention substantially as claimed. However, Tanaka et al. does not disclose the reflector-polarizer as a 'broadband' reflector-polarizer, as recited.

In the same field of endeavor (It is noted that Tanaka et al. additionally teaches that their optical system (40c) is equally useful in a *virtual* image display arrangement, as discussed in connection with Figure 17, atop col. 13. Thus, the two disclosures are in the same field of endeavor.), Hoppe discloses an optical system comprising a converging element and cholesteric reflector-polarizer. Hoppe teaches that the display can be modified to provide a multicolored or broadband image by stacking cholesteric layers in the reflector-polarizer (See for example Figure 2).

It would have been obvious to one of ordinary skill to stack a plurality of cholesteric layers in the reflector-polarizer (13c) of Tanaka et al., in the interest of providing a multicolored or broadband image, as suggest by Hoppe. One of ordinary skill would have appreciated that the provision of a full-colored display would have offered greater marketability through greater consumer acceptance. The Examiner believes that the stacked cholesteric layers, providing the 'wider bandwidth' operation suggest by Hoppe (col. 6, lines 3-5) fairly qualifies as a 'broadband' reflector-polarizer. However, if such is not the case, then the following applies.

In the same field of endeavor, Phillips Electronics teaches that prior art broadband 'polarizers' obtained by serially stacking a plurality of cholesteric layers having different band-pass characteristics suffer from several drawbacks including disclinations, loss of planar molecular order, and angular dependence stemming from requisite large



thicknesses. In order to overcome these issues, Phillips Electronics teach that a single cholesteric layer can be provided with a variable pitch so as to provide a broadband polarizing characteristic.

In practicing the invention of Tanaka et al., it would have been obvious to one of ordinary skill to employ a variable-pitch, broadband cholesteric layer in place of the multi-layered reflector-polarizer as suggested by Hoppe, in the interest of providing a reflector-polarizer that overcomes the drawbacks associated with serially-stacked cholesteric layers, as taught by Phillips Electronics.

With regard to Claims 6 and 8, the converging element comprises a beam splitter (half mirror coat) on the convex surface thereof so that the beam splitter is located between the source and the real image.

With particular regard to Claim 9, Tanaka et al. suggest integrating the polarizer-reflector (13c) on the plano surface of the converging element (41c) (col. 10, lines 52-59). In such an embodiment, the converging element would “comprise” the broadband reflector-polarizer.

With particular regard to Claim 12, the at least one converging element may be considered as being the concave reflector defined by the half mirror coating on the surface of lens 41c.

With regard to Claims 14 and 15, Phillips Electronics teach that cholesteric polarizers can be operated in a recirculating configuration wherein theoretically, nearly 100% of the incident light ultimately becomes polarized (Page 2, lines 14-26). One of ordinary skill would have recognized this as corresponding to a transmissive/reflective efficiency of

nearly 100%. It is clear however, that the actual efficiency would depend upon the operating bandwidth of the cholesteric polarizer with respect to the light source. Thus, it is believed that the broadband polarizer suggested by Hoppe would have had at least the recited 60% efficiency. However, Phillips Electronics further teach that the prior art stacked cholesteric layers having different band-pass characteristics suffer from several drawbacks including disclinations, loss of planar molecular order, and angular dependence stemming from requisite large thicknesses. In order to overcome these limitations, Phillips Electronics teach that a single cholesteric layer can be provided with a variable pitch so as to provide a broadband polarizing characteristic. The examples of Phillips Electronics are operative over substantially the entire visible wavelength region. Thus, it is believed that one of ordinary skill would have arrived at 90% efficiency, at least in view of the teachings of Phillips Electronics.

#### ***Allowable Subject Matter***

14. Claims 1, 2, and 7 are allowed. See the Office Action dated 9/1/05 with regard to reasons for allowance for Claims 1, 2, and 7.

#### ***Conclusion***

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Group Art Unit 2872  
4/25/06